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FEDERAL-STATE COOPERATIVE SNOW SURVEYS AND IRRIGATION WATER FORECASTS

for

COLORADO RIVER DRAINAGE BASIN

APRIL 1, 1941

By

Division of Irrigation, Soil Conservation Service
United States Department of Agriculture
and
Colorado Agricultural Experiment Station

Data included in this report were obtained by the agencies named above in cooperation with the U. S. Forest Service, National Park Service, State Engineers of Colorado, Wyoming and New Mexico and other Federal, State and local organizations.



SNOW SURVEYS AND IRRIGATION WATER FORECASTS for COLORADO RIVER BASIN April 1, 1941

municipalities, irrigation associations, power companies, and others. Precipitation records are supplied by the Division of Irrigation, Soil Conservation Service, U. S. Department of Agriculture, in cooperation with State work is otherwise conducted cooperatively with the State Engineers of Utah and Colorado, State Planning Board The following data pertaining to snow surveys and irrigation water-supply forecasts are provided by the departments, other federal oureaus and local organizations. The snow measurements are made principally by field personnel of the following Federal Government organizations: Forest Service, National Park Service, Geological Survey, Bureau of Reclamation, Indian Service; and the Utah Agricultural Experiment Station. of Wyoming, U. S. Geological Survey, Utah and Colorado Agricultural Experiment Stations, and various U. S. Weather Bureau.

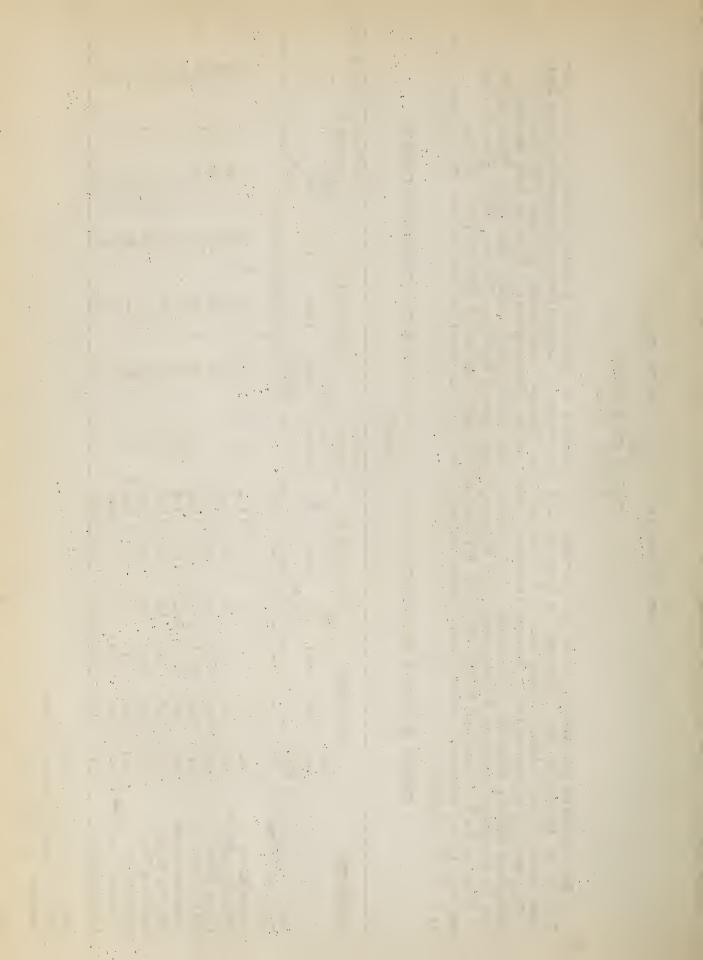
SUMMARY OF APRIL 1 SNOW SURVEYS AND COMPARTSON OF DATA WITH THAT OF PREVIOUS YEARS BY WATERSHEIDS

						Number				1941 Water Content	r Content in
WATERSHEDS	Snow Depth	epth	Water	r Content	ent	Courses	Snov	Snow Density		percent o	of
	Six		Six			in	Six			Six	
	Year 1940	1941	Year	1940	1941	Average	year	1940	1941	Year	1940
	AVE.*		Avg. *				AVE.*			AVE c*	
COLORADO RIVER	In. In.	In.	In.	In.	In.		Percent	Percent	Percent		
Green River		3703	12,5	1,6	11.1	93	31	32	30	68	122
Colorado River**		38.7	13,2	10.9	17.4	8	31	33	8)	87	104
Yampa River		0°24	19.3	16.8	14.9	r	34	36	32	77	89
White River	50.6 34.2	١, ٢	17.4	13.5	16.6	N	34	<u></u> 3	32	95	123
Gunnison River		55.1	1603	1302	17.9	12	225	34	32	110	135
Dolores River		42,3	11,1	8,3	13.6	m	30	37	32	122	164
San Juan River		58.5	14,1	4.9	19.8		35	32	75.	1740	309
Gila River		2.7	0.3	000	1.0	00	143	1	37	333	# P P P P P P P P P P P P P P P P P P P
Colorado River***	41.2 38.6	42.9	14,0	14,1	14.8	9	3/4	37	35	106	105
Virgin River	44.2 19.6	1681	16,1	6,8	18,6	5	36	35	39	115	274

^{*}Some for shorter periods

^{**}Above Grand Junction, Colorado

^{***}Green to Virgin Rive



(Based on incomplete returns)

Departure from Normal	Inches	+0.58 -0.10 +0.82 +1.80
Precipitation March	Inches	2.47 0.70 1.71 3.03 1.51
Departure from Normal	Inches	+1.50 -0.12 +4.11 +6.29 +3.04
Precipitation October 1 to March 31	Inches	10.84 9.16 10.02 8.24
STATE		Colorado Wyoming New Mexico Arizona New Mexico
WATERSHED		Colorado Green San Juan Gila

Gila and San Juan drainages. Also the accumulated precipitation since October 1 is more than double that for the and Arizona was above normal during March except in Wyoming. The greatest excess for the month occurred on the Precipitation on the watershed of the Colorado River and its tributaries in Colorado, Wyoming, New Wexico For the Green River drainage in Wyoming the rainfall, October 1 to date is slightly same period last year. less than a year ago.

WATER SUPPLY OUTLOOK

content is short of last year by about 10 percent and only 77 percent of the six-year average. The headwaters of the White have more snow than a year ago by about 25 percent, and the present condition is in line with the than a year ago and 10 percent above the average. On the Dolores the water content is better than a year ago average of the past six years. The Gunnison drainage is still better with a 35 percent greater water content COLORADO RIVER AND TRIBUTARIES IN COLORADO. The snow pack in the high mountains of the main Colorado River 75 percent of the average discharge since 1936, for this period. On the Yampa drainage the present water above Grand Junction approximates that of last year but is only 87 percent of the past six-year average. April-July run-off of this stream at Glenwood Springs will be about 1,000,000 acre-feet or approximately by 64 percent and 25 percent above the average.

Durango of at least 400,000 acre-feet which will be about 10 percent more than the past 5-year average for this SAN JUAN. The April first snow surveys over this drainage show the water in snow storage to be 200 percent best in years. Water content of the snow on the Animas River watershed indicates an April-July run-off at period and about 1/3 more than last year. On the Upper San Juan snow course, 1 mile west of the summit of more than last year and nearly a half greater than the 6-year average. The outlook now appears to be the

3 \$1

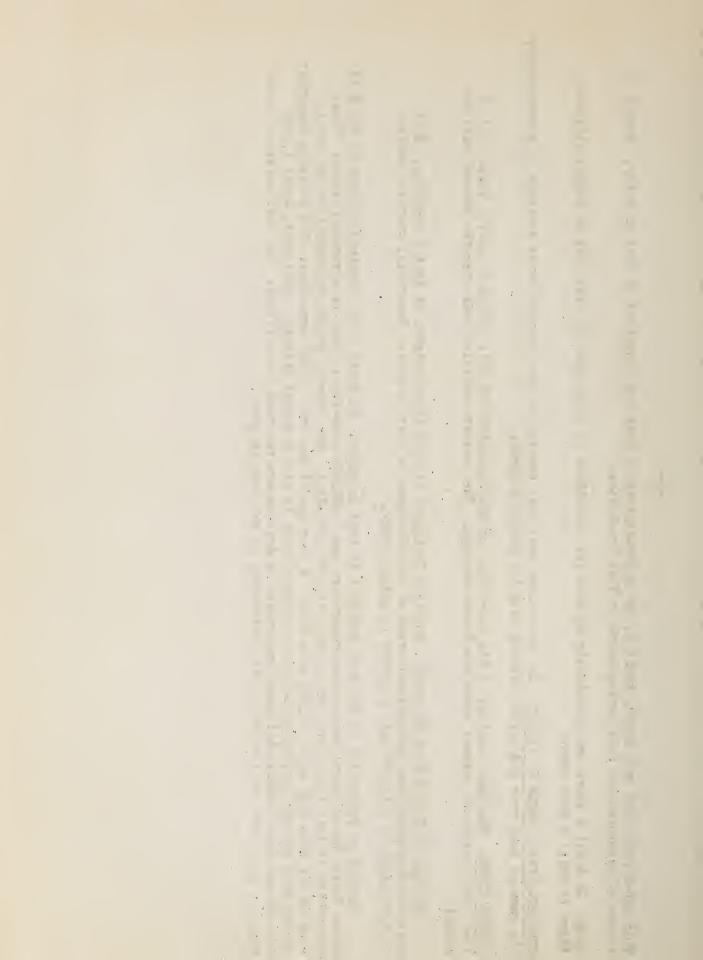
Wolf Creek Pass, the snow depth, April 1, was approximately 11 feet and contained 32 feet of water. Nearly 11 inches of precipitation fell during March on Wolf Greek Pass.

On April 1 there was practically no snow for elevations of 7,000 feet or less, but at higher altitudes there is still a good cover. The snow cover over this section of the Colorado River drainage is approximately the same as last year and agrees closely with the 6-year average. COLORADO RIVER, GREEN TO VIRGIN,

The present condition indicates the run-off will be VIRGIN RIVER. The water content of the snow cover on the headwaters of this stream is nearly twice that of last year, and is 15 percent above the 6-year average. normal.

moisture throughout the agricultural areas of this drainage is fair to good. Generally, over the entire Storage in Taylor Park Reservoir, Gunnison Drainage, is only three-fourths of that a year ago. western slope of Colorado soil moisture is satisfactory.

also at all time high with 127,825 acre-feet. A year ago it had only 15,000 acre-feet. The Coolidge Reservoir Storage in reservoirs on the Gila and Salt is best in years. On April 1 the combined storage in the Salt storage was only 50,000. All small reservoirs in Arizona are reported to be filled. The soil moisture in the reservoirs at this time last year had only 165,000 acre-feet. The storage behind the Carl Pleasant dam is on the Gila now has 615,600 acre-feet in storage which is also a record filling. Last year, April 1, the River Valley Water Users! Association reservoirs was 1,685,000 acre-feet. This is a record filling. Fila and Salt River valleys and on the watersheds is the best in years.

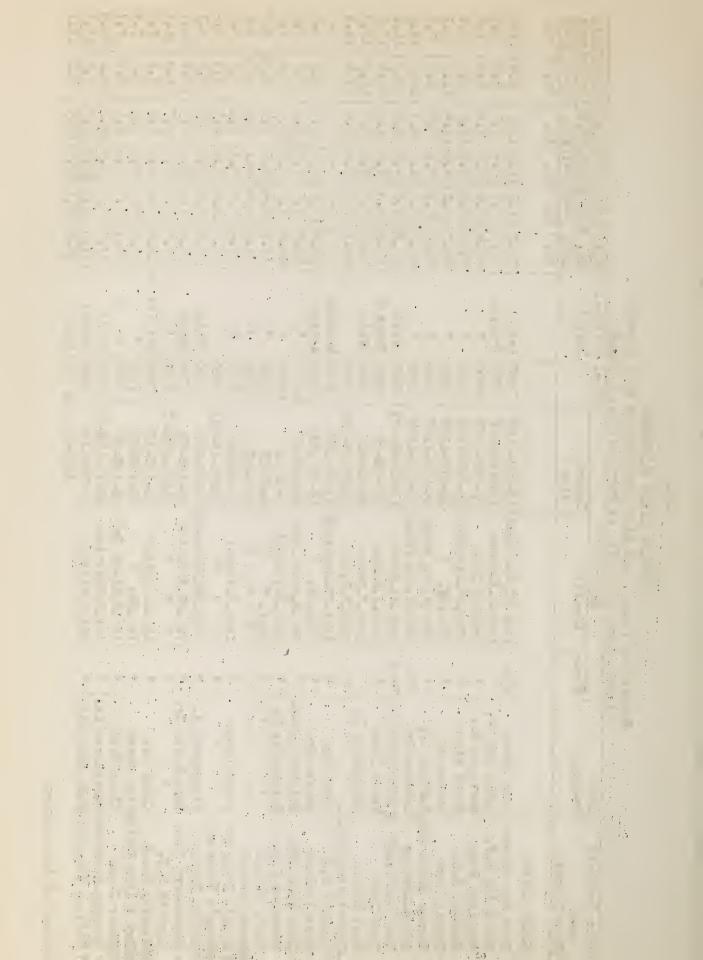


COLORADO RIVER WATERSHED

Summary of Federal and State Cooperative Snow Surveys Issued April 10, 1011 at Fort Collins Colombo

	Ĭ	Issued April	April 10, 1941, at	Fort Collins	•	Colorado					
Main Drainage	Local		Location		Elev.	National	Apr.	1 Snow C	Course N	Measurements	nents
and	Drainage	State	Locality	Descrip-		Forest	Av. S	Snow Depth	Av. W	Av. Water Content	ntent
No Snow Course				tion			Avge	1940 1941	AVE.	1940	1941
GREEN RIVER							In.	In. In.	In.	In.	In.
7 East Rim Divide	Fish Crook	Man	1 Zmi ST. Bondinant	WILL MYZ GZ	7050	+ ° E	7 0	L	(((
23 Dutch Joe R.S.	Dutch Joe Cr.)) =	12mi.N.Elkhorn	M401-M15-25	× 700	Wvomine	0 0	10.00.01	7 7 7	מ מ	11 °C
Ann	Surveyor Cr.	=	Fremont Lake	W801-N55-71	8900	0 4	36.4	0	- σ	0 0	0.0
	Green River	=	dale	23-38N-110W	7900	=	31.0	110		0 0	× ×
26 Loomis Park	Beaver Cr.	=		14-37N-111W	8500	=	146.7		15	11.2	9.7
27 Snyder Basin R.S	R.S.S.Piney Cr.	=	Big Piney	15-29N-114W	80/10	=	33.5	20.8 35.1	1 9.8	0.9	
28 Piney-LaBarge	LaBarge Cr.	=	Piney	19-29N-114W	8820	=	45.2	10	1,4	10.5	12.5
23 Daniels-Strawberry Strawberry R.	y Strawberry R.	\mathbf{U}_{tah}	0	17&20-2S-12W	8000	Uinta	42.8		7		11.1
28 Lost Lake	Provo River	=		14&5-23-9国	0066	Wasatch	67.0	\sim	23	18.4	17.7
33 East Portal	Strawberry L.	=	25mi .E.Provo	36-7S-6E	7600	Vinta	36.6	10	0 13.0	10.0	10.3
33AE.Port.Strawbry.D	= 0	=		34&35-7S-63	8000	=	59.7		,건	17.4	16.9
34 Hewinta R.S.	West Fork	±	33mi.SE.Evanston	33-3N-13E	9500	Wasatch	1	1	1	.	` !
35 Hole-In-Rock	Beaver Cr.	= :		13-2N-15E	9150	Ashley	22.4	18,6 21.	6 5.3	3.8	5.0
36 Lake Fork Mtn.	YellowstoneCr.	E	uni .E. Moon Lake		10500	=	42.3	22.5 40.5	5 9.2	4.1	9.1
37 Paradise Park	Whiterocks R.	=	25mi.NW.Vernal		10500	=		23.7 39.	12	3.8	9.6
38 Mosby Mtn.#1	=	E	22mi. "	63	9700	=		20 04636.5	0	7.80	0
384Mosby Mtn.#2	=	=	=======================================	5-2N-1E	9500	=		20.4/42.		11.36	, W
Cabin	Brush Creek	=	18mi.N.Vernal	22-18-21E	8800	=		22.9 33.		4.3	8,0
39AKing's Cabin #2		=		23&26-1S-21E	8600	=	31.3	18.4 31.	-	7.2	8
40 Indian Canyon	Strawberry R.	=	V.Duchesne	2-118-10国	9100	Uinta				7	8.7
41 Gooseberry Res.	Gooseberry Cr.	=	7mi.NE.Fairview	25-138-5国	0028	Wanti	59.6	51.6 55.2	N	20.6	20.3
42 Mammoth R.S.	=	=		13&23-138-5国	8800	=			-	21.0	21.7
42AStahley Ranch	Clear Cr.	=	ield	F	7600	Off Forest				3.2	7.9
42BDry Valley DivideFish Creek	Fish Creek	=	7mi.NE.	20-128-8国	7800	=				8	7.7
42dClear Creek	Clear Creek	=	Clear Cr.	28-138-75	8150	=	16.3		9	7.6	7.7
43 Hntngtn-HorseshoeHuntington Cr.	Huntington Gr.	=	7mi.E.Fairview	12813-148-5国	9800	Man ti	77.4		28	28.1	
53 Widtsoe EscalanteE. FK. Escalante	E. Fk. Escalante	E	6mi.E.Widtsoe	22-34S-1W	9500	Powell	31.0	5	10	4.5	3
	-			Average for		Drainage	39.8	28.1 37.	3 12.5	9.1	٦
pAverage of two courses	Ses							. _		1	

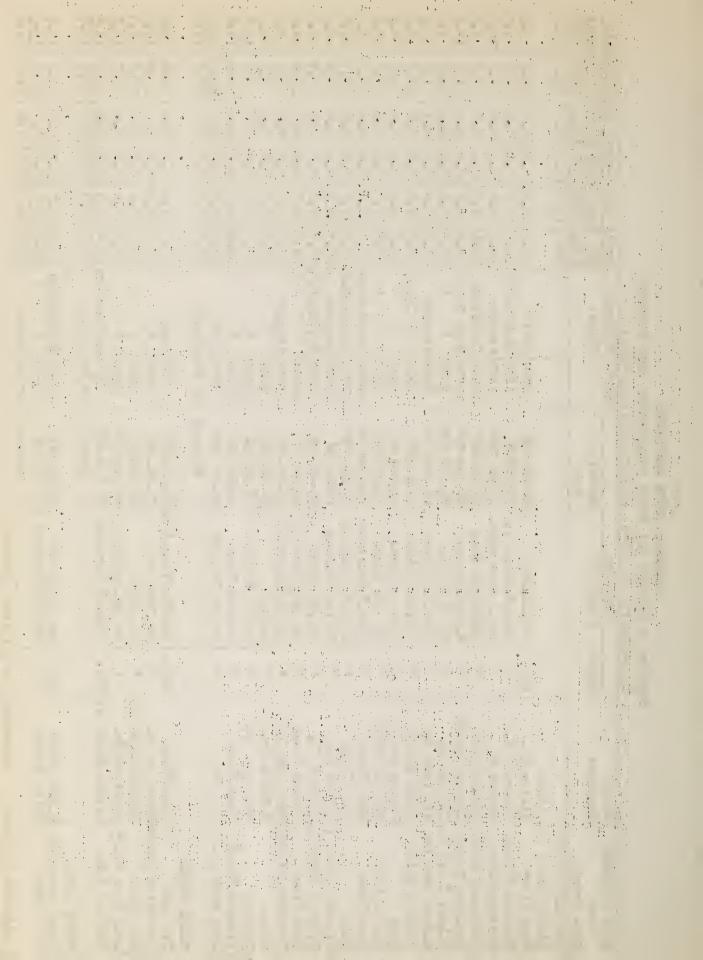
pAverage of two courses



COLORADO RIVER WATERSHED

Summary of Federal and State Cooperative Snow Surveys Issued Anril 10, 1941, at Fort Collins, Colo.

			Issne	Issued April 10, 1941,	at Fort Colli	ins, Colo	• 0					
	Wain Drainage	Local		Location		Elev. Na	Wational	Apr .1	Snow	Course	Measurer	ements
	and	Drainage	State	Locality	Descrip-	드	מי		Snow De	Þ.	er C	ontent
No	No Snow Course	1			tion		7	0	1940 1	AVE	1940	1941
	COLORADO RIVER							-	In.	In. In.	In.	In.
	(Above Grand Junction)	iction)										
	Park View*	Willow Cr.	Colo	7mi.SE	24-5N-78W		Routt		27.8	25.6 11.4	10	8
	Phantom Valley	Colorado R.	*=	llmi.N.Grand L.	7-5N-75W	9300 R	Ry.Mtn.N.P.		25.6	0 10	_	7.7
	Berthoud Pass	Fraser R.	=	Umi.S.West Port.	7		Arapaho	10	19° Q1	91 6.	17	15.4
	Tennessee Pass*	Eagle River	E	Ω.	∞		pa		5	3.1 8		8.0
	Ind.Pass Tunnel	Lincoln Gulch	=	Tunnel	30-11S-82W		S	10	N	18	13	14,1
	N.Lost Trail Cr. Crystal	Crystal R.	Ħ	Smi.E.Marble	20-11S-87W	9200	E	01		9	10.4	8,0
	M.Fork Camp Gr.	Williams Fk.	=		16-3S-77W		oque	OI		6 9		7.6
	Fiddler Gulch	Eagle River	E		1-85-80W		088	10		.8 13		12.9
	Nast	Frying Pan R.	=	15	1-9S-83W	8700	=	0		9		4.8
	Maroon Lake	Maroon Creek	=	Smi.SW. Aspen	7-11S-85W	9300	=======================================	02		.6 12		12.8
	Mesa Lakes	Mesa Creek	=	.Palisade	35-11s-96W		Grand Mesa	10		18		23.7
-	Lulu	Lulu Creek	=	Grand L.	25-6N-76W	10200 R		OI		.8 16		11.0
	Willow Creek P.	Willow Cr.	=	SQ SQ	1-4N-78W	-	Arapaho			.1 13		10.2
	N.Inlet Grand L.	Grand L. N. Inlet Cr.	=	e Fil	26-4W-75W	9000 R	N.P	10		20		6.3
		Beaver Creek	E	lmi.SW.Milner P.	8-5N-75W		=	10		.9 20		14.0
	Thunderbolt Peak	PeakBuchanan Gr.	=	5mi.E.Mona,rch L.	22-2N-74W	4	rapaho	. —		.9 15	 	15.1
69	Arrow	S.Ranch Cr.	ten Gra	Arrow	34-1S-75W			0		. 80		2
-	Lapland	St.Louis Cr.	=	ង	16-25-76W	9300	=	~~~	, cy	33.9 10.8		10.8
161	Fremont Pass#2	Blue River	=		2-88-79W	11100	=	-+		•6.16		14.0
	Lynx Pass No. 2	Rock Cr.	=	S	27-2N-83W		دہ	+1	28.5+	53	11	11.7
					Average f	or Drainag	age []		S	13		
	YAMEA HIVER		~~~							nnew dansers		
		Soda Creek	Colo.	team.Spgs	26-7N-84W		tt	7.5	Q	20	18	14.9
			=	Pass	21-5N-82W	9300		3.2	مُ	21	17	16.3
		Independence Cr.	= :		6-10N-85W	8700		π° 0		38.3 16.5	13	12.0
91 1	* 		=	Poponas	~	9100	=	7.2	ď	[13]	11	11.7
	Rambler R.S.	Little Snake R.	Wyo.	13mi .SW.Encmpmnt	25-14N-86W	8600	neBow		1.5	55.0 24.6	23.0	19.4
	WHITE RIVER				Average 1	or Prair	rainage	0	0	0 I J	16	14.9
35	Mountain	N.Elk Creek White River	Colo.	Smi.S.Buford	15-28-91W 28-1N-88W	9000 WP	WhiteRiver	55.9	41.7	56.7 19.6	16.2	19.7
					Average f	or drainag	Φ	9	4.2	17	13.	
d o	adjacent drainage	ge theadings	do	original course.			_	-	_	-		



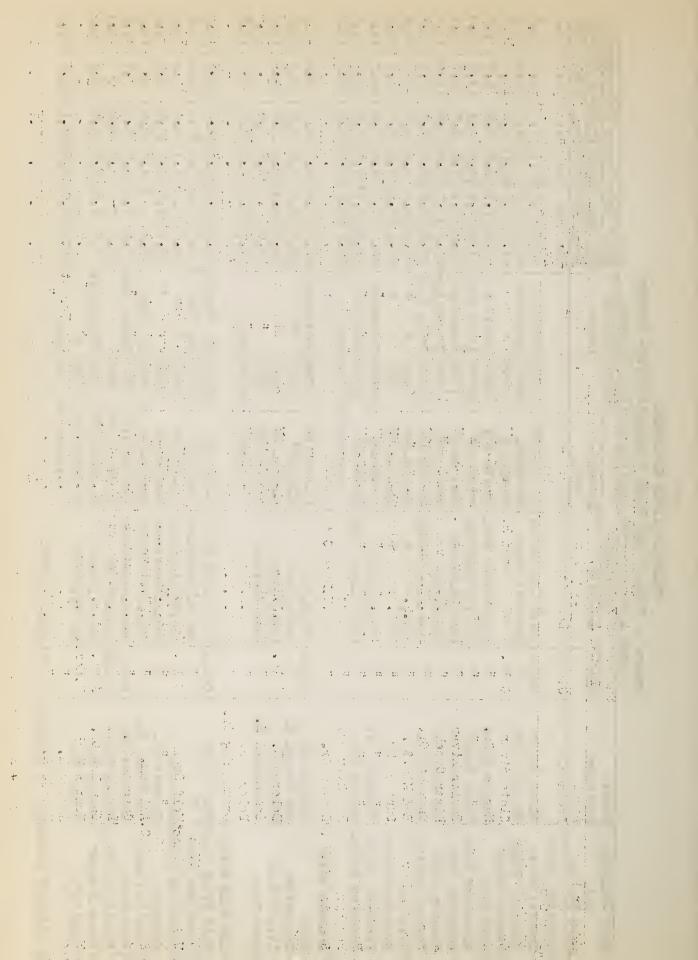
-6-COLORADO RIVER WATERSHED

Summary of Federal and State Cooperative Snow Surveys

			Issu	Issued April 10, 1941,	at Fort Coll	Collins, Colorado				
	Main Drainage	Local		Location		Elev. National	님	Snow Course Meas	asurement	nts
	and	Drainage	State	Locality	Descrip-	Forest	Av. Snow	w Depth Av. Wa.	ter Cont	tent
No	Snow Course				tion		Avg. 19	940 1941 Avg.	1940	1 941
	GUMMISON RIVER						In. In	. In. In.	In.	In.
18	Crested Butte	Slate River	Colo.	3mi.N.Crested B.	22-135-86W	9000 Gunnison		48.7 15	10.2	14.8
742	Marshall Creek	Marshall Cr.	t -	hall Pass	24-48N-6E	Cochetopa	146.9 32	32.7 53.6 14.1	10.8	3 15.8
143	Poncha Creek*	=	*	==	19-48N-7E	10500 #		51.1	10.2	15.4
94	Park Cone	Taylor River	±	Park Res.	19-14S-82W	Gunnison		34.4	1.4 1.4	7.5
53	Alexander Lake	Kiser Creek	=	.Cedaredge	10	Grand Mess			17.8	27 •0
55	Snowshoe Mesa	Snowshoe Cr.	=	16mi NE Paonia	14-13S-89W	7500 Gunnison		15.4	200	5.7
58	Ironton Park	Red Mtn, Cr.	==	5mi.S.Ouray	29-43N-7W	Uncompahgi		45.8	15.3	17.8
85	Trickle Divide	Surface Cr.	=	•Cedaredge	23-118-94W	Grand Mesa	72.8	84.2	21.1	27.5
98	Trickle	==	=	=	34-118-94W	9700 "	61,6	73.3	17.9	25.6
87	Park Reservoir	=======================================	=	=======================================	34-115-94W	=		75.5	1.	26.4
89	Porphyry Creek	Porphyry Cr.	=	Monarch Pass	19-49N-6E	Cochetopa	54.8 48	2 61.4	174.7	19.4
46	Sunshine Mt.No.	Mt.No. ZHenson Cr.	=	Lake City	35-44N-6W	10200 Gunnison	0	1739.2	11.74	11.8
			A		Average f	or Drainage	50.2 39	1 55.	13.2	17.9
	DOLORES RIVER									
	Rico	Dolores R.	00100	2mi.S.Rico	11-38N-11W	8700 Montezuma		33.7 8	9•9	10.7
5,4	Telluride	San Miguel R.	=	Telluride	6-142N-8W	8600		08 31.7 7	7.1	10°7
25	Lizard Head	Dolores R.	=	Rico	24-4111-10W	10300 "	56.4 35	.3 61.5 17	11.2	19.7
9	Lone Cone	Ground Hog Cr.	=	16mi.N.W.Rico	23-41N-13W	11 0068	32°4 -	- 32	Į Į	12.7
					Average i	for Drainage	36.9 22	.3 42.3 11	8.3	13.6
	SAN JUAN RIVER									
56	Wolf Creek Pass*Welf Creek	Wclf Creek	Colo.	Wolf Creek Pass	4-37M-2E	10000 Rio Grande	86.0	0	5	37.2
53	Upper San Juan	==	=	hmi.W.WolfCr.P.	10-3711-11五	10000 San Juan		128.6	18.6	75°0
30	Silverton Sub.S.	AnimasR.	=	.Silverton	10-41M-7W	1 1 0046			2.2	5.0
31	Cascade	Cascade Cr.	=	5mi.N.Electra L.	12-39N-9W	8850 # 11		41.5	5.3	14.2
93	Granite Peaks	Los Pinos R.	=	E.Columbus	24-37N-6W	7950 San Juan	31.6 -	- 31.6 16.0	į į	16.0
N	Roof Butte	Chin Lee Cr.	Ariz.	8mi.S.Luka.chukai	36.4N109.1W	8500 Navajo Res		.2 48.7	2.7	
13	Washington Pass	Tuntsa Wash	N.Mex	.NE Crystal	26.1N108.8W	8600 #	12.6	36.5	EH	13.5
17	Chama Divide*	Amargo R.	=	. Chama	36.9N106.7W	0 062		0 16.0	0.0	
- 1	Chamita*	Navajo R.	=	6mi.NW.Chama	ĝ	8500 "	1		1	
					Average fo	or Drainage	40.6 16	16.5 58.5 14.1	+°9	19.8

+ Readings on original course.

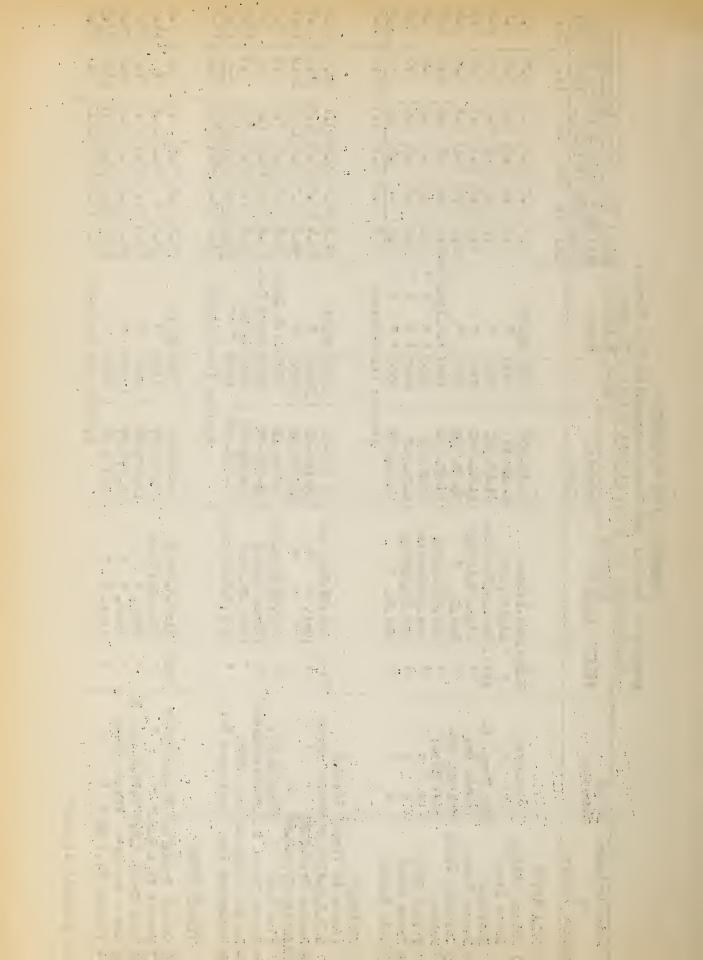
*On adjacent drainage



COLORADO RIVER WATERSHED

Summary of Federal and State Cooperative Snow Surveys

			IssI	Issued April 10, 1941	, at Fort	Collins,	Colorado					
	Main Drainage	Local		Location	. —	Elev.	ational	Apr.1 S	Snow Cou	Course Mea	Measurements	nts
	and	Drainage	State	Local ity	Descrip-		Forest	Av. Snow	\square	Av.Water		Content
No	No Snow Course				ti on			Avg. 1940	40 194I	Avg.	1940	1941
	GIT, A RIVER							In. In	• In•	In.	In.	In.
	Trico Divide	Rlne River	N. M.	Mex 6mi.S.Tuna	MUC-SY-LZ	8000	Anache	0 7			C	C
171	State Line		=	Alpine: Luna	6-6s-21W	8000		0.0	0 0) r
~	Nutrioso	San Fran. R.	Ariz.	z. 5mi.SE.Nutrioso	23-6N-30E	8500	=		0	0	0.0	1.0
4	Begver Head	Castle Cr.	=		13-411-30五	8000		1.5 0	0	0	0.0	2.9
5	Coronado Trail	Coleman Cr.	==		26-jiv-30E	8000	-		6 0.	0	0.0	3.4
9	McNary	Salt River	=		14-8N-23E	7200	W.M.Ind.Res		0	0	000	0.0
_	Forest Dale	=	E	5mi .SW.Showlow	2-9N-21 E	0009	den den den	0.0	0.0	0	0.0	0.0
00	Trout Creek	==	=	3mi .SW .McNe.ry	5-7N-24E	6400	=======================================	0.0	0.0	0.0	0.0	0.0
6	Milk Ranch	=	=	4mi.W. "	28-8N-23E	2000			0.0	0.0	1	0.0
					Averag	ge for	Drainage	0.7.0	.0 2.7	0	0.0	1.0
	COLORADO											
	(Green to Virgin Rivers						inger-day kallin					
14		Seeley Creek	\mathbf{U} tah	8mi.SE.Ephraim	ស្ត	10200	Manti	65.3 65	≠.		24.6	22.4
148	Seeley Cr. R.S.#1	=	=	=	25-173-1国	10000		52.4 62 62	1	2	24.0	21.6
187	48ASeeley Cr. R.S.#2	== ~	=	F	25-178-4国	10000	22		~	17	19.4	18.1
51	Fish Lake	Fremont Cr.	=	2mi.SW.FishLake	35-26s-1E	8700	Fish Lake	-	5	_	9.7	8.2
54	Bryce Canyon N.F.*Paria River	F.*Paria River	=		Š		Bryce N.P.	15.8 0	0	9	0.0	۲۰۲
75	La Sal Moyntain Mill Creek	Mill Creek	=	E.Moab	59-568-54国			29.4 28	5	200	9.3	10.9
65	Buckboard Flat	Montezuma Cr.	=	6mi.W.Monticello	36-33S-22E	9000			- 1 [1	16.3
	VIRGIN RIVER				Averag	ge for	Drainage	17.5 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0	9	7	14.1	14.8
96		t.Virgin River	Ut_{ah}	Jlmi.N.Kanab	22-38S-6W	7500	Dixie		0	- ح	0.0	8.1
57	_	= *.	=	29mi .SE.Cedar	21-38S-7W	7700	=			5	E4.	14.2
58		* N.Fk.Virgin R.	=	=	11-38S-8W	8560	dres gas		5	17	7.0	22.8
50		Virgin River	2 2	=	73	10200	=		•	25	16.0	25.1
19	Webster Flat RS.	*	=	11mi. "	20-378-9W	9200	=	55.5 28	5		11.0	23.0
3		_			Average	ge for	Drainage		9	16.1	0.8	18.6
5	*On adjacent drainage	ವಿಶ್								_	Securit	



FEDERAL - STATE
COOPERATIVE SNOW SURVEY

A RATIONAL APPROACH
TO THE RESEARCH PROB-LEM OF FORECASTING FLOW OF STREAMS NECESSARY FOR IRRIGATION, DOMESTIC AND MUNICIPAL WATER SUPPLY, HYDRO-ELECTRIC POWER GENERATION, NAVIGATION, MINING AND INDUSTRY.

A NATIONAL DEFENSE UNIT

